A Work Project, presented as part of the requirements for the Award of a Masters Degree in Economics from the Faculdade de Economia da Universidade Nova de Lisboa.

HIV-RELATED DISCRIMINATION IN SUB-SAHARAN AFRICA: EXPLANATORY CHARACTERISTICS AND CONSEQUENCES ON EMPLOYMENT AND HIV-TESTING

ANA INÊS DA SILVA VILELA (275)

A Project carried out on the Economics course, with the supervision of:

Professor Adeline Delavande

28th of December of 2010

HIV-RELATED DISCRIMINATION IN SUB-SAHARAN AFRICA: EXPLANATORY CHARACTERISTICS AND CONSEQUENCES ON EMPLOYMENT AND HIV-TESTING

Abstract

This work contributes to a better understanding of HIV-related discrimination in sub-Saharan Africa, through its two main objectives: understand the determinants of stigma behaviour and evaluate its impacts on employment and HIV-testing. Concerning the determinants, the importance of adequate HIV-knowledge in avoiding stigma behaviour is one of the main findings. Regarding the impacts of HIV-related discrimination, it is observed that HIV-positive individuals are less likely to be employed in regions with higher levels of stigma and finally that facing higher discrimination may increase the probability of taking an HIV-test due to positive signalling effects.

Keywords: HIV/AIDS, discrimination, sub-Saharan Africa

1. INTRODUCTION

In its 2009 Annual Report, the Joint United Nations HIV/AIDS Programme (UNAIDS) estimated that 33.4 million people live with HIV. And that in 2008 alone there were 2.7 million new infections, half of those among individuals under 24 years old. Aimed at fighting the HIV epidemic through reducing the number of new infections, several awareness and testing campaigns have been developed in the last decades. Recently, additional effort is being made in the dissemination of treatment facilities that administrate new antiretroviral therapies, which increase considerably the quality and length of life of HIV positive individuals. Unfortunately, the results of these programmes might be undermined by discrimination suffered from people living with HIV (PLWH). It is discussed that fear from stigma and consequent social exclusion prevents people from being tested due to insufficient confidentiality of the results and furthermore, prevents individuals who know their status from seeking treatment. Aware of the perverse impact of stigma behaviour UNAIDS, in its homepage[1] considers 'removing punitive laws, polices, practices, stigma and discrimination that block effective responses to HIV by driving people away from HIV services thus reducing an individual's ability to avoid HIV' as one of its ten priorities.

Despite this recent awareness of institutions on discrimination distortions, there is still a lack of literature aimed at understanding its causes and measure its real effects, especially in the region of the world's most affected by the HIV epidemics: the Sub-Saharan Africa. Consequently, the present work contributes to a better understanding of HIV-related discrimination, through the answer of the following questions: firstly, which social-demographic factors are associated with discrimination towards PLWH

[1] <http://www.unaids.org/en/Priorities/03_06_Punitive_laws_stigma.asp>

and secondly, which real impacts of this stigma behavior affect the employment status of infected individuals and the willing to accept an HIV-test.

The countries analyzed in this study are Zimbabwe, Lesotho, Zambia and Swaziland because they face the highest infection rates in Africa and consequently in the world, with correspondent rates of 18.14%, 23.08%, 14.21% and 25.88%[2].

Throughout this work HIV-related stigma will be defined as "a 'process of devaluation' of people either living with or associated with HIV/AIDS" and "discrimination follows stigma and is the unfair and unjust treatment of an individual based on his or hers real or perceived HIV status", following the definitions introduced by UNAIDS (2003). Hence, discrimination is considered as any negative action towards someone living with HIV motivated by stigma considerations, as is usually established in this topic literature[3].

A brief review of previous literature and studies that share the current work's objectives is presented in the next Section. Section 3 introduces the Data (3.1) and Methodology (3.2) used to achieve the Empirical Results presented in Section 4. Both the methodology subsection and the results section are divided accordingly to the work's two main objectives: understand the determinants and the consequences of HIV-related discrimination. Section 5 concludes.

2. PREVIOUS WORKS ON HIV/AIDS-RELATED STIGMA

Early research on stigma and discrimination focused on the development of an adequate conceptual framework, which was essential to reach the current stage of discussion. Goffman (1963) is considered a milestone in this process through the conceptualization of the three individual components of stigma: the 'abominations of the body', the

[2] My own calculations based on DHS (Demographic and Health Surveys) testing.

[3] It is common practice to consider discrimination as the manifestation of stigma, for example see Ogden and Nyblade (2005).

‘blemishes of individual character’ and ‘tribal stigma’. Although all different components motivate the HIV-related stigma, the second is especially important since carrying this virus is usually seen as a rightful punishment for social misbehaviour. Recently, Parker and Aggleton (2003) enriched the discussion through the conceptualization of stigma and discrimination as a process of social interaction through which powerful groups subjugate minorities and consequently producing an uneven distribution of the community’s resources. Furthermore, the latter authors alert for the interdependency between HIV/AIDS-related stigma and pre-existing inequalities within the society considering race, gender and sexuality and further defend that programme intervention should be intended to the community instead of focusing on the individual level.

Despite the indispensability of conceptual work on stigma and discrimination, data collection and analysis were fundamental to a deep understanding of stigma manifestations and consequences in the developing world. In response to this need, the Global Programme for AIDS (GPA), created by the World Health Organization (WHO), developed in 1994 a general research protocol to be applied to countries in order to assess the determinants of this phenomenon. Aggleton (2000) describes findings of programmes conducted in India and Uganda that follow the GPA protocol. In both countries, despite general HIV knowledge, misconceptions on the transmission of the disease grounds unnecessary avoidance and social exclusion of PLWH and others connected with them, which is in line with my results. Reports of health care services denial after the discovery of patient’s HIV-status by health-workers were found in India. In Uganda half of the respondents reported acceptance by their families after positive status disclosure.

Also inspired in the GPA protocol, other projects were funded by UNAIDS for further collection and analyses of data, namely the ones developed by the International Centre for Research on Women (ICRW) and partners. These studies were conducted from 2001 to 2004 in Ethiopia, Tanzania, Zambia and Vietnam and consisted in in-depth interviews with a relative low number of infected individuals, their families and leaders of their communities. The main findings presented by Ogden and Nyblade (2005), concern high discrimination towards sex workers, drug users and homosexuals infected with HIV, which were blamed by their immoral behaviour and considered to be rightfully punished through infection. Although in these cases being infected was also considered a consequence of promiscuity or careless, reports of understanding and acceptance from family members and, in time, some community members were collected from respondents, once again. Since the studied countries have a relative low prevalence rate of infection concentrated in 'risky groups', the discrimination towards PLWH may be overestimated because of the difficulty to disentangle it from the negative considerations towards these excluded minorities. Using a sample of countries where the infection affects a larger share of the population may contribute to a more accurate measure, although the association of HIV infection with risky behaviour is not absent in this scenario. An example of a previous study that focus on a country with high infection rate is Letamo (2003), which evaluates the factors associated with HIV discrimination in Botswana. The author uses the same database source as the present study and his conclusions on the importance of age, level of education and a deep knowledge of the transmission of HIV are in line with my own results. Till this day, Letamo's work is the only that have based his analysis of HIV/AIDS-related discrimination in Demographic Health Surveys as I have done in the present work.

3. DATA AND METHODOLOGY

3.1.Data

The MEASURE Demographic and Health Surveys (DHS) is a project funded mainly by the U.S. Agency for International Development (USAIDS) with the objective to collect and disseminate high quality data that encourages enlightened policy-making in developing countries. The use of this source has several advantages, namely the availability of nation wide representative samples, the possibility for cross-country comparison due to a similarity of questionnaires and methods of collecting and processing data and finally the international credibility that DHS has achieved due to its large experience and association with valuable partners such as ICF Macro[4].

The choice of the countries studied conjugated on the one hand the objective to focus on the most recent data on regions with high prevalence of HIV and on the other hand the availability of data on discrimination and the virus testing. The surveys that satisfied the previous conditions and therefore compose this work's sample are the 2005/06 Zimbabwe DHS, the 2004 Lesotho DHS, the 2007 Zambia DHS and the 2006/07 Swaziland DHS. Appendix A presents the distribution of each country's sample by main social-demographic characteristics.

Concerning the data on HIV status of respondents, it is important to mention that the HIV-test conducted by DHS, and used to compute regional prevalence rates of HIV, has some particularities namely that respondents do not know the tests results and in general its a much more confidential test than the ones usually conducted by national HIV

[4] ICF Macro is an ICF International company, which offers technical assistance to governments and business for collecting and analyzing data in statistically valid forms. <http://www.macrointernational.com>

Campaigns. Therefore, the objective of the latter in changing sexual behaviours by learning individual's HIV-status is not present in the DHS testing procedure.

Following DHS recommendations the descriptive statistics used in this work were adjusted for different probabilities of a subgroup to be included in the sample. Hence, sampling weights were applied to individual observations in order to guarantee a correct expansion from the sample subgroup divisions to a national characterization. It is important to notice that the weighting process in the present sample yielded no significant modifications, being its application a mere reassure of the quality of the sample design. Only some under representation of males in the Lesotho sample yielded some small differences. Finally, it is also important to note that this weighting procedure was not applied to regressions due to the possible bias of the results' statistics, as is suggested by Rutstein and Rojas (2008).

3.2.METHODOLOGY

Discrimination towards PLWH is a complex social phenomenon, which induced a diversified literature written by both sociologists and medical professionals that defended in-depth and qualitative forms of measuring the phenomena. Although acknowledging the advantages in following these more complex processes, it would be impossible to use them in the present work due to a lack of access to the studied populations. Therefore, the choice of the appropriate measure of HIV-related discrimination was restricted to the DHS data collection, from which the following questions were considered as the most appropriate to serve this purpose[5]:

[5] Other variable accessible from the surveys concerned the availability of respondents to take care of a family member with HIV. This was not included in the analysis because cultural aspects related to family solidarity, may influence the answer and therefore not be uniquely motivated by stigma considerations.

i. "If a teacher has HIV but is not sick, should he or she be allowed to continue teaching?"

ii. "Would you buy fresh vegetables from a shopkeeper or vendor if you knew this person has HIV?"

Throughout the study, questions i. and ii. will be the measures used to evaluate the level of HIV-related discrimination. In order to allow the modelling of these questions as dependent variables, when the respondent replied 'Don't know' that observation was treated as a missing value. This decision, instead of consider it a negative answer, was motivated by the fact that these observations were in reduced number when compared with the actually studied 'yes' and 'no' answers, as shown in Appendix B.

3.2.1. DETERMINANTS OF HIV-RELATED DISCRIMINATION

In order to evaluate the factors associated to the discriminatory behaviour, the two precedent questions were regressed on several demographic and social characteristics as well as knowledge of HIV. The model used is the following logistic function[6] regressed twice for each discrimination measure i. and ii.:

$$stigma = \beta_0 + \beta_1 age + \beta_2 urban + \beta_3 female + \beta_4 education + \beta_5 married + \beta_6 hiv\ prevalence + \beta_7 knowledge\ condoms + \beta_8 knowledge\ one\ partner + \beta_9 knowledge\ look\ healthy + \beta_{10} wealth + \beta_{11} religion + \beta_{12} know\ hiv\ positive + \beta_{13} country + \varepsilon_i \quad (1)$$

Next, it must be explained how the variables that compose equation 1 were defined. Age was divided in four groups, being the range of the omitted one from 15 to 21 years old. The impact of living in urban instead of rural areas and being female instead of male are controlled through the two following dummies. Concerning education, there are five levels of attainment: no education (omitted level); primary education; secondary

[6] Alternative probit specifications were regressed but yield no major differences in the models' conclusions.

education and superior education. The marital status of an individual varies between: ‘never married’ (omitted characteristic), ‘currently married’ and ‘previously married’. The next variable is the regional HIV prevalence rate, computed by me, using the DHS test results. The three subsequent variables in equation 1 indicate the HIV knowledge of an individual. The first two variables relate to the agreement or not of the survey statements: ‘People can avoid HIV by always using condom during sex’ and ‘People can avoid HIV by having only one sexual partner’, respectively. The third knowledge variable refers to the following question: ‘Can a person that looks healthy be infected with the HIV virus?’. All three have as possible answers: ‘No’ ‘Doesn’t know’ and ‘Yes’, being the first the omitted group against which the remainders will be compared.

Measuring wealth through surveys can be problematic because of incomplete information that respondents usually give, either caused by lack of memory or intentional lie. Therefore DHS in their surveys constructs a household wealth index, *wealth*, based on the presence or not of certain goods observed during the interviews, which allows to assign each household to one of the five categories created: ‘poorest’, ‘poor’, ‘medium’, ‘rich’, ‘richest’.

According to religion, each country has several unique beliefs, which did not allow the inclusion of all possible creeds in the analyses. Nevertheless, Catholic, Protestant, Islamic and Pentecostal beliefs were present in at least three countries and therefore included as dummy variables in the regressions.

The objective of the dummy variable *know hiv positive* is to measure the impact of ‘knowing to be HIV-positive’ in the stigma behaviour towards other infected people. Therefore, the variable takes a unit value if the individual had both been tested before and has a positive score in the DHS test. I want to consider only these individuals

instead of all the ones that had a positive result in DHS test, because the individual may not know his status, since this test results are not known. Following this reasoning, individuals that have never been tested or that only took the DHS test are expected not to be sure of their status and therefore will have a zero score in the dummy.

Lastly, national effects were controlled through the *country* dummy.

3.2.2. IMPACTS OF HIV-RELATED DISCRIMINATION

The second purpose of this work was to understand the impacts of discrimination on employment and on HIV testing. Hence, the former impact was measured through a logistic regression with the employment status as the dependent variable. The independent variable of interest is, in this case, *stigma*hiv positive* which measures the impact on the employment status of being HIV positive against not being infected, when the level of stigma behaviour increases. Additionally, the independent impacts of being HIV positive[7] and face different levels of stigma are controlled through individual *hiv positive* and *stigma* variables.

$$work = \beta_0 + \beta_1 stigma \times hiv\ positive + \beta_2 stigma + \beta_3 hiv\ positive + \beta_4 hiv\ prevalence + \beta_5 age + \beta_6 urban + \beta_7 education + \beta_8 married + \beta_9 country + \beta_{10} religion + \beta_{11} bmi + \varepsilon_i \quad (2)$$

Equation 2 was regressed separately for male and female, being the only difference in the specification the absence of the Body Mass Index (*bmi*) variable in the male regression, due to the non-existence of data. It was attempted to find a substitute variable, which could also ascertain the effect of health deterioration that prevent someone infected from working from the discrimination effect, but without success. Further, female and male were regressed separately because it is expected that the labour market conditions, cultural factors and individual's preferences vary according to

[7] The *hiv positive* dummy takes an unit value for all individuals with a positive result in the DHS test, being therefore more comprehensive than the *know hiv positive* dummy used in equation 1.

gender. As before, equation 2 was regressed twice to account for both measures of the discrimination level, *stigma*, towards teachers and vegetable vendors infected with HIV. Initially, when defining the dependent variable, *work*, all the work market was considered in the analysis except household activities whose workers were expected to face no discrimination. However, it could be the case that individuals that are self-employed in the agriculture sector do not face discrimination from employers (since they do not have one) and should be excluded too. Nevertheless, it could also be argued that these people must sell their products in order to continue their activity, and as shown in this study, face discrimination from the buyers, which would compromise their employment status. Hence, it would be interesting to treat separately all the market and then exclude the agriculture self-employed sector and see if the discrimination effect varies. Thus the four regressions based on equation 2 were rerun excluding this controversial sector from the work market and maintaining the independent variables unchanged.

The last objective of this work was to understand the possible impact of stigma behaviour in the refusal of being tested for HIV. In order to do so, the following equation models the refusal of an individual in taking the HIV test provided by DHS and the variable of interest in this case is *stigma*.

$$refuse\ DHS\ test = \beta_0 + \beta_1 stigma + \beta_2 hiv\ prevalence + \beta_3 age + \beta_4 urban + \beta_5 education + \beta_6 wealth + \beta_7 married + \beta_8 country + \beta_9 religion + \beta_{10} relation\ hh\ head + \varepsilon_i \quad (3)$$

As before, the model will be regressed four times to account for gender and discrimination measurement differences, maintaining all independent variables unchanged. A new variable was used in equation 3, *relation hh head*, which represents the relation of the respondent with the household head. The rationale is to account for

possible differences in household power, which can affect the independence of decision-making in taking the test.

The HIV test, conducted by DHS and used for the dependent variable, has the particularity that the interviewee does not have access to the test results and further, he has the guarantee that the results will not be divulged in his community since testing will be done in a distant laboratory and that no name information is attached to the blood sample. Therefore, it is possible that individual's motivation for refusing this test is different from those conducted in a pre-natal clinic or in other usual testing facilities where unwanted disclosure of the results is usually the ground for test refusal, as reported by Aggleton (2000). In order to assess if people are more willing to take this more confidential form of test and if not knowing the results affect their decision, the previous regressions were reran, being the refusal of the DHS test replaced by a binary variable with unit value if respondents had never been tested till that moment (and zero for those who had been tested).

Finally it must be mentioned that all regression outputs presented in Appendices C to G and analysed in subsections 4.2 and 4.3, are presented in terms of discrete changes in the case of dummy variables and marginal effects for continuous ones, allowing a more direct interpretation of the results as suggested in Park (2009).

4. EMPIRICAL RESULTS

4.1. DESCRIPTIVE STATISTICS

The four analysed countries present very different levels of discrimination, not only across themselves, but also within their territory. Despite the heterogeneity of situations, one aspect is common to all possible group comparisons: individuals always

demonstrate more stigma behaviours towards infected vegetable vendors than towards teachers, as can be observed in Table1:

	"If a teacher has HIV but is not sick, should he or she be allowed to continue teaching in the school?" **'No'**		"Would you buy fresh vegetables from a shopkeeper or vender if you knew this person has HIV?" **'No'**	
	Female (%)	Male (%)	Female (%)	Male (%)
Zimbabwe	25.81	25.27	42.79	33.99
Lesotho	43.45	52.98	51.23	54.66
Zambia	18.88	19.26	32.76	27.22
Swaziland	6.75	8.89	24.5	21.25

Table 1: Percentage distribution of negative behaviours towards people living with HIV.

Table 2 shows the sample descriptive statistics concerning labour force participation and HIV-testing, essential for a better understanding of the discrimination impacts. The two first columns show separately the unemployment rates within the HIV-positive individuals and the unemployment rates among those not infected. For example, in Zimbabwe HIV infected males face an unemployment rate of 29.32% while those not infected face an unemployment rate of 41.99%. This 'evidence' in favour of the HIV-positive individuals is obviously biased by education and other characteristics, which will be controlled later on. The last two columns present the share of individuals that refused to take the HIV-test conducted by DHS and the percentage of individuals that have never been tested before. As we can observe the refusal rate of DHS is much lower when compared with the refusal rate of having took the test in previous HIV-campaigns.

	Unemployment rate among HIV+ individuals		Unemployment rate among HIV- individuals		Ind. that refused to take HIV-test by DHS		Individuals' never tested before	
	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)	Female (%)	Male (%)
Zimbabwe	62.17	29.32	67.05	41.99	14.84	21.50	74.27	82.29
Lesotho	56.87	59.71	68.76	71.52	11.58	16.03	84.16	88.94
Zambia	44.71	64.52	54.04	84.48	19.23	19.64	59.16	76.65
Swaziland	51.95	28.12	64.27	54.61	7.32	12.36	58.89	80.51

Table 2: Descriptive statistics on labour force participation and HIV-testing

4.2. DETERMINANTS OF HIV/AIDS-RELATED DISCRIMINATION

Although infected vegetable vendors face more discrimination than teachers (Table 1), the social-demographic characteristics associated with stigma behaviour towards both groups yield similar conclusions, except when we consider gender. As shown in the results of Appendix C, being female reduces the probability of supporting the expulsion of an infected teacher from teaching but increases the odds of refusing to buy fresh vegetables from a vendor with HIV. A possible explanation is that since females are the ones that usually buy and cook the food products they may be afraid of contracting the disease through handling the same goods as someone with the disease or they might feel more responsible for the 'quality' of food that enters the household. This argument is only valid in a scenario of high misperceptions about HIV transmission.

The remainder of this subsection will focus on the socio-demographic characteristics that affect HIV-related discrimination towards the two groups in the same manner, allowing sound inferences on possible targets for future campaigns oriented to reduce discrimination.

From the analysis of Appendix C we can observe that individuals belonging to older age groups are less discriminative compared to those in the younger groups, with ages between 15 and 22. And on the contrary, a habitant of a rural area is more likely to

discriminate compared with an individual with the same characteristics living in a city. It is also visible a strong effect of having different levels of education particularly when comparing individuals with superior education with those with no education, having the former at least 18 percent more chance of not discriminate compared with the latter, holding the remaining variables constant at mean values. It is also interesting to notice that, despite being significant, the effect on the discrimination of having primary education instead of none is considerably smaller being around the 4 percent, *ceteris paribus*. These values alert us for the fact that having some level of education does not, by itself, reduce considerably the discrimination towards PLWH.

A pattern similar to this is found throughout the different levels of wealth. Although when compared to the poorest, belonging to any of the wealthier groups improves the chances of being less discriminative towards PLWH, individuals in the 'richest' category are at least 11 percent less likely to discriminate compared with the 'poorest' while those in the 'poor' group face a respective probability of only 2 percent, being the other variables constant at reference points.

Other set of variables, which are associated with lower discrimination towards both teachers and vegetable vendors living with the virus, is the one concerning HIV-knowledge. For example, individuals who know that a person who looks healthy can be infected are 14 and 16 percent more likely not to discriminate teachers and vegetable vendors respectively, than those who believe that healthy looking people cannot have the virus, *ceteris paribus*. Furthermore, knowing that having only one sexual partner or that always using a condom reduces the chance of being infected also increases the probability not to discriminate. These conclusions stress the need of adequate

campaigns that deal with misperceptions in the manifestation and transmission of the virus.

From the impact of *know hiv positive* variable we conclude that individuals who know they are infected are less prone to discriminate others in the same situation.

Individuals belonging to the Catholic, Protestant or Pentecostal beliefs are less likely to discriminate when compared with the remaining national religions. The impact of belonging to the Islamic religions is not statistically significant.

Concluding this analysis, Appendix C also demonstrates that Zambia and Swaziland citizens are less prone to discrimination of PLWH relative to those from Zimbabwe and that the opposite occurs comparing the Lesotho nationals.

4.3. IMPACTS OF HIV/AIDS-RELATED DISCRIMINATION

The next section focus on two possible perverse effects of HIV-related discrimination, namely on employment and on the refusal to be tested for HIV. Despite the undeniable importance of analyzing both effects, one cannot forget the humanitarian aspect of discrimination which results in social exclusion and destruction of individuals' well-being and self-esteem. Therefore, even if there were no significant impact on economic variables or on the effectiveness of HIV programs, governments and the international community should still be concerned with this attack to human rights of those living with HIV.

4.3.1.IMPACTS OF HIV/AIDS-RELATED DISCRIMINATION: EMPLOYMENT

In order to assess the economic impacts of the HIV-related stigma behaviour, the employed status of the respondents were analysed using equation 2 and the results in terms of marginal effects are presented in Appendix D. It is clear, by analyzing the results, that HIV-positive individuals living in areas with higher stigma face a much

lower probability of being employed than not infected individuals with the same characteristics. The increase of one percentage point on the stigma faced makes an infected woman at least 15 percent less likely to be employed as if she were not infected with the virus, keeping all other covariates constant at their mean values. In fact this probability might be quite larger, if instead we use the upper measure of stigma behaviour given by discrimination against vegetable vendors. In this case the correspondent negative impact is 28 percent, instead of the 15 previously mentioned. Additionally, similar conclusions can be drawn to male individuals.

Because of the reasons explained in Section 3, the previous analysis was redone excluding the agriculture self-employed sector. The results displayed in Appendix E show that there is still a negative impact of HIV-related discrimination on the ability of infected workers to have a job, after excluding the mentioned economic sector. Furthermore, it is interesting to notice that excluding individuals self-employed in agriculture from the analyses sharply decreases the magnitude of the negative impact of discrimination in employment, which is consistent with previous considerations on the profound mistreatment that vegetable vendors suffer due to misperceptions about the virus transmission through the handling of food products.

It is clear from the previous results that PLWH faces discrimination in the labour market. The immediate economic impacts of unemployment may throw individuals into poverty traps deepened by health costs with the arising of AIDS symptoms. In aggregate terms, the exclusion of workers reduces the country labour force and may limit the supply of high-qualified individuals since this group usually presents a relative high infection rate.

4.3.2. IMPACTS OF HIV/AIDS-RELATED DISCRIMINATION: TESTING

Appendix F presents the results of equation 3 regressed separately for man and woman and using the two different discrimination measures towards infected teachers and vegetable vendors. Unexpectedly, belonging to more discriminative environments reduces the probability to refuse the HIV test, for both man and woman. The rationale behind this result may be that the testing is a form of signalling that a person is sure of his negative status and has no problem in being submitted to the test. On the contrary, rejecting the test may be interpreted as if the person has something to hide and will be seen as carrying the HIV virus. It must be stressed however that this argument presupposes an elevate level of confidentiality of the HIV-testing procedure, which guarantees that the decision of taking the test will not result in unwanted status disclosure. In other words, that there are no anticipated costs in doing the signalling.

Due to the particularities of DHS testing, it was then considered the impact of *stigma* on previous HIV testing, as explained in Section 3. The results, presented in Appendix G, are not as straightforward as the previous ones. Considering females, the impact of discrimination, measured towards vendors, has a similar effect as in the DHS test: living in regions with more stigma behaviours decreases the probability of refusing the test. Therefore, the above-mentioned impact of the DHS test particularities may not play a role. On the other hand, male results are contradictory if a 10% of significance is used in the examination. The effects associated with *stigma* are negative as before if measured as discrimination against vegetable vendors. Yet if the teachers measure is used, the effect is positive, with an associated p-value of 9,5%. It could be discussed that the prediction of social discrimination presented by stigma behaviour towards teachers may be underestimated and therefore not able to fully capture the length of the problem, which is better caught by the behaviours towards vegetable vendors that

describes a more discriminative scenario. Following this argument, one might conclude that the positive signalling effect is also present in other test procedures and that policy-makers may not worry with discrimination when designing HIV-testing campaigns.

Acknowledging the complexity of social behaviours as the present one and the limitations of the available measurement variables, in the absence of straightforward results it is preferable to draw cautious conclusions. Therefore, the conclusions drawn from this subsection should be limited to the DHS test results for the particular benefits in using such a confidential test design, when is the case that governments only aim to measure the population's HIV infection rate.

5. CONCLUSION

The main conclusion of this work concerning the HIV-related determinants is that differences in education and knowledge of HIV strongly explain stigma behaviour. Individuals with superior education are at least 18% less likely to discriminate when compared with those with no education and individuals knowing that being infected with HIV does not necessarily means that the person has to look sick present 14% less probability to discriminate holding the remain variables constant at mean values. Furthermore, indicators of inaccurate knowledge of the virus transmission were also found to increase the probability to discriminate. Therefore, an effective way of reducing stigma behaviour towards PLWH is through programmes aimed to eliminate misperceptions about the manifestations and forms of transmission of HIV. From the analysed countries, Zimbabwe and Lesotho are the ones in most need of such campaigns.

Concerning the economic impacts of HIV-related discrimination, it was shown that highly discriminative environments reduce the probability of an infected individual to

be employed. HIV-positive males are at least 9% less likely to be employed with an increase in one percentage point of the level of stigma, while HIV-positive females face a correspondent probability of 6%. The labour market discrimination is even deeper when the agriculture self-employed sector is considered in the analyses, reassuring the high level of discrimination that food vendors face when it is known or suspected that they are infected. Finally, in regions with high levels of discrimination taking an HIV-test may be used as a form of signalling to the community that one is not infected nor is afraid to be, in a context where HIV-test campaigns do not disclosure the test results.

REFERENCES

Aggleton, Peter. 2000. "HIV and AIDS-related stigmatization, discrimination and denial: forms, contexts and determinants. Research studies from Uganda and India." UNAIDS Best Practice Collection Working Paper 00.16E.

Goffman, Erving. 1963. *Stigma: Notes on the management of a spoiled identity.* New York: Simon and Schuster.

Letamo, Gobopamang. 2003. "Prevalence of, and Factors Associated with, HIV/AIDS-related Stigma and Discriminatory Attitudes in Botswana". *Journal of Health, Population and Nutrition,* 21(4): 347-357.

Ogden, Jessica, and Laura Nyblade. 2005. "Common at Its Core: HIV-Related Stigma Across Contexts". http://www.icrw.org/files/publications/Common-at-its-Core-HIV-Related-Stigma-Across-Contexts.pdf.

Park, Hun Myoung. 2009. "Regression Models for Binary Dependent Variables Using Stata, SAS, R, LIMDEP, and SPSS". The University Information Technology Services (UITS) Center for Statistical and Mathematical Computing, Indiana University Working Paper. http://www.indiana.edu/~statmath/stat/all/cdvm/index.html.

Parker, Richard, and Peter Aggleton. 2003. "HIV and AIDS-related stigma and discrimination: a conceptual framework and implications for action". *Social Science and Medicine,* 57: 13-24.

Rutstein, Shea O. and Guillermo Rojas. 2008. "Guide to DHS Statistics". http://www.measuredhs.com/pubs/pdf/DHSG1/Guide_DHS_Statistics.pdf.

UNAIDS, 2003. *Stigma and Discrimination Fact Sheet.* http://data.unaids.org/publications/Fact-Sheets03/fs_stigma_discrimination_en.pdf.

UNAIDS, 2009. *Annual Report.* http://data.unaids.org/pub/Report/2010/2009_annual_report_en.pdf.

APPENDICES

Appendix A: Sample Description

	Zimbabwe		**Lesotho**		**Zambia**		**Swaziland**	
	Female	Male	Female	Male	Female	Male	Female	Male
Age								
15-21	2,923 32.82%	2,629 36.64%	2,396 33.77%	968 34.61%	2,143 29.99%	1,880 28.92%	1,718 34.45%	1,640 39.46%
22-29	2,591 29.09%	1,819 25.35%	1,847 26.03%	659 23.56%	2,234 31.26%	1,584 24.37%	1,306 26.19%	1,134 27.29%
30-39	2,055 23.07%	1,523 21.23%	1,547 21.80%	532 19.02%	1,774 24.83%	1,673 25.74%	1,138 22.82%	844 20.31%
40+	1,338 15.02%	1,204 16.78%	1,305 18.39%	638 22.81%	995 13.92%	1,363 20.97%	825 16.54%	538 12.95%
Place of Residence								
Urban	3,203 35.96%	2,459 34.27%	1,945 27.41%	694 24.81%	3,178 44.47%	2,831 43.55%	1,544 30.96%	1,441 34.67%
Rural	5,704 64.04%	4,716 65.73%	5,150 72.59%	2,103 75.19%	3,968 55.53%	3,669 56.45%	3,443 69.04%	2,715 65.33%
Education								
No educ.	380 4.27%	124 1.73%	169 2.38%	549 19.63%	741 10.37%	298 4.58%	413 8.28%	332 7.99%
Primary	2,971 33.36%	2,113 29.45%	4,309 60.73%	1,512 54.06%	3,805 53.25%	2,990 46%	1,636 32.81%	1,428 34.36%
Secondary	5,297 59.47%	4,541 63.29%	2,520 35.52%	665 23.78%	2,242 31.37%	2,720 41.85%	2,541 50.95%	2,018 48.56%
Superior	259 2,91%	397 5.53%	97 1.37%	71 2.54%	358 5.01%	492 7.57%	397 7.96%	378 9.10%
Wealth								
Poorest	1,623 18.22%	1,242 17.31%	1,160 16.35%	543 19.41%	1,131 15.83%	1,145 17.62%	778 15.60%	585 14.08%
Poor	1,614 18.12%	1,359 18.94%	1,405 19.80%	553 19.77%	1,245 17.42%	963 14.82%	857 17.18%	639 15.38%

Medium	1,618 18.17%	1,312 18.29%	1,259 17.74$	551 19.70%	1,409 19.72%	1,315 20.23%	934 18.73%	787 18.94%
Rich	1,905 21.39%	1,795 25.02%	1,455 20.51%	568 20.31%	1,733 24.25%	1,600 24.62%	1,059 21.24%	922 22.18%
Richest	2,147 24.10%	1,467 20.45%	1,816 25.60%	582 20.81%	1,628 22.78%	1,477 22.72%	1,359 27.25%	1,223 29.43%
Total	8,907 55.38%	7,175 44.62%	7,095 71.72%	2,797 28.28%	7,146 52.37%	6,500 47.63%	4,987 54.54%	4,156 45.46%

Appendix B: Number of 'dk' answers to questions i. and ii. not considered the sample

		Zimbabwe	**Lesotho**	**Zambia**	**Swaziland**
Question i.	**'dk'**	**485**	**199**	**380**	**228**
	'yes'+'no'	15305	8937	13165	8875
Question ii.	**'dk'**	**110**	**145**	**109**	**130**
	'yes'+'no'	15689	8991	13436	8973

Note: The following values inside brackets correspond to P-values.

Appendix C: Factors Associated with HIV-related discrimination (Equation 1)

Dependent variables Independent variables	"If a teacher has HIV but is not sick, should he or she be allowed to continue teaching in the school?" '**No'**	"Would you buy fresh vegetables from a shopkeeper or vender if you knew this person has HIV?" '**No'**
*23≤age≤29**	-.0243 (0.000)	-.0208 (0.004)
*30≤age≤39**	-.0274 (0.000)	-.0211 (0.012)
*age≥40**	-.0205 (0.004)	-.0158 (0.086)
*Urban**	-.0429 (0.000)	.0040 (0.583)
Female	-.0216 (0.000)	.0507 (0.000)
*Primary education**	-.0387 (0.000)	-.0666 (0.000)
*Secondary education**	-.1552 (0.000)	-.2244 (0.000)
*Superior education**	-.1794 (0.000)	-.2781 (0.000)
*Currently married**	.0104 (0.081)	.0163 (0.026)
*Formerly married**	.0227 (0.012)	.0162 (0.128)
HIV prevalence rate	.0002 (0.802)	-.0009 (0.347)
*Always use condoms reduce chance of transmission: 'Yes'**	-.0434 (0.000)	-.0214 (0.002)
*Always use condoms reduce chance of transmission: 'dk'**	.0031 (0.764)	.0460 (0.001)
Only have one partner reduce	-.0485	-.0338

*chance of transmission: 'Yes'**	(0.000)	(0.000)
*Only have one partner reduce chance of transmission: 'dk'**	.0276 (0.070)	.0449 (0.021)
*Can a person who look healthy have HIV: 'Yes'**	-.1419 (0.000)	-.1582 (0.000)
*Can a person who look healthy have HIV: 'dk'**	-.0263 (0.016)	.0065 (0.700)
*Poor**	-.0166 (0.003)	-.0225 (0.003)
*medium**	-.0411 (0.000)	-.0540 (0.000)
*Rich**	-.0735 (0.000)	-.0772 (0.000)
*richest**	-.1143 (0.000)	-.1344 (0.000)
*Catholic**	-.0058 (0.297)	-.0195 (0.005)
*Protestant**	-.0200 (0.001)	-.0153 (0.038)
*Muslim**	.0058 (0.861)	-.0122 (0.751)
*Pentecostal**	-.0139 (0.084)	-.0239 (0.018)
*Lesotho**	.1445 (0.000)	.0590 (0.000)
*Zambia**	-.0841 (0.000)	-.1065 (0.000)
*Swaziland**	-.1709 (0.000)	-.1633 (0.000)
*know hiv positive**	-.0369 (0.000)	-.0799 (0.000)
Nº of observations *Pseudo R-squared*	43610 0.1843	44387 0.1078

Appendix D: Effects of HIV-related Discrimination on Employment

Dependent variable: The respondent is currently working, except household sector (marginal effects & discrete changes(*))				
	Female		Male	
Independent variables	*Stigma* measured towards teachers	*Stigma* measured towards veget vendors	*Stigma* measured towards teachers	*Stigma* measured towards vegetable vendors
stigma×hiv positive	**-.1475** **0.009**	**-.2818** **0.000**	**-.1907** **0.019**	**-.2952** **0.006**
Stigma	.1697 0.006	.6675 0.000	.5670 0.000	.5766 0.000
*hiv positive**	.0518 0.001	.1196 0.000	.0476 0.061	.1085 0.10
(*)	…	…	…	…
Nº of observations *Pseudo R-squared*	20222 0.0922	20222 0.0964	12412 0.2185	12412 0.2176

(*) The remaining variables of equation 2 are not presented here, due to space constraints.

Appendix E: Effects of HIV-related Discrimination on Employment (restricted)

Dependent variable: The respondent is currently working, except household and agriculture self-employed sectors (marginal effects & discrete changes(*))				
	Female		Male	
Independent variables	*stigma* measured towards teachers	*stigma* measured towards veget. vendors	*stigma* measured towards teachers	*stigma* measured towards veget. Vendors
stigma×hiv positive	**-.0561** **0.322**	**-.1384** **0.048**	**-.0924** **0.254**	**-.1869** **0.080**
Stigma	-.0547 0.385	.2085 0.001	.1837 0.029	.2675 0.014
*hiv positive**	.0309 0.044	.0671 0.013	.0171 0.496	.0639 0.145
(*)	…	…	…	…
Nº of observations *Pseudo R-squared*	17614 0.1292	17614 0.1296	10363 0.2554	10363 0.2556

(*) The remaining variables of equation 2 are not presented here due to space constraints.

Appendix F: Effects of HIV-related Discrimination on Testing (DHS Test)

Dependent variable: Respondent refused to take the DHS HIV-test. (marginal effects & discrete changes(*))				
	Female		Male	
Independent variables	*stigma* measured towards teachers	*stigma* measured towards veget. vendors	*stigma* measured towards teachers	*stigma* measured towards vegetable vendors
stigma	**-.1208** **0.000**	**-.0598** **0.073**	**-.0685** **0.102**	**-.1403** **0.002**
HIV prevalence rate	-.0018 0.026	-.0014 0.081	-.0009 0.361	-.0019 0.076
(*)	…	…	…	…
Nº of observations *Pseudo R-square*	24288 0.04	24288 0.0395	20334 0.0326	20334 0.0330

(*) The remaining variables of equation 3 are not presented here due to space constraints.

Appendix G: Effects of HIV-related Discrimination on Testing (Never been tested)

Dependent variable: Never been tested for HIV. (marginal effects & discrete changes(*))				
	Female		Male	
Independent variables	*stigma* measured towards teachers	*stigma* measured towards veget. vendors	*stigma* measured towards teachers	*stigma* measured towards vegetable vendors
stigma	**.0007** **0.986**	**-.2376** **0.000**	**.0731** **0.095**	**-.1062** **0.010**
HIV prevalence rate	-.0095 0.000	-.0121 0.000	.0002 0.766	-.0015 0.135
(*)	…	…	…	…
Nº of observations *Pseudo R-square*	27456 0.1006	27456 0.1014	20257 0.0840	20257 0.0842

(*) The remaining variables of equation 3 are not presented here due to space constraints.